

GROUND SQUIRREL ERADICATION.

CALIFORNIA STATE BOARD OF HEALTH.

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PLAGUE FLEA OF CALIFORNIA.

TABLE OF CONTENTS.

	PAGE.
1. GROUND SQUIRREL ERADICATION.....	507
2. THE STORY OF PLAGUE.....	512
3. WHEN COMMERCE AND HEALTH UNITE.....	518

DEPARTMENT REPORTS FOR JANUARY, 1911.

(a) Bureau of Vital Statistics	524
(b) Food and Drug Laboratory.....	528
(c) Hygienic Laboratory	530
(d) Bureau of Epidemiology.....	531

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The California State Board of Health meets regularly the first Saturday of each month, but the stated meetings of January, April, July, and October constitute the quarterly meetings required by law to be held at the Capitol of the State.

By courtesy of the University of California the Food and Drug Laboratory and the Hygienic Laboratory are located in University buildings at Berkeley, California.

Address all communications to the

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JANUARY BULLETIN.

GROUND SQUIRREL ERADICATION.

By Passed Assistant Surgeon FRIENCH SIMPSON, P.H. and M.H.S.

The ground squirrel may be said in truth to overrun the entire Pacific coast. It is found in Alaska, and from there south along the coast into Mexico, and east, beyond the Rocky Mountains. When we include its near relatives, the prairie dog of the Western Plains and the ground hog of the east, representatives of the family may be said to exist over the entire United States. But the pest we know here—the ground squirrel—causes trouble enough, and no time need be wasted looking up the family history. What we are particularly interested in is the economical destruction of the squirrel, and the problem requires much serious attention.

Without doubt the ground squirrel is the greatest pest with which the California agriculturalist has to deal. He takes toll from all. The orchardist, the farmer, the gardener, the ranchman, all contribute toward his support, and the cost of his keep has become so excessive he should be considered a menace demanding the attention of all land owners. Recently he has come into still greater prominence because of the disease he harbors and perpetuates—bubonic plague, and the two crimes, his destruction to crops and his danger to health, call for his absolute extermination. This can be accomplished only through active destructive efforts and this paper will be confined to the discussion of such measures as may be undertaken for this purpose by the individual land owner.

It may be said in advance that no germ has yet been found which, injected into squirrels, will result in the production and spread of a deadly disease among them. Such a method would be ideal in squirrel eradication, and much work has been done and is being done in this direction, but a disease, harmless to man, yet fatal to squirrels and rapidly spread among them, has yet to be found.

It has been reported that in certain communities, farmers on finding sick squirrels have transported them for the purpose of infecting other localities. This should be discontinued at once, since such methods might easily be the means of transmitting plague, and the transportation of such diseased squirrels would seriously endanger the lives of those handling them.

There are three general ways in which squirrels may be readily destroyed:

First—By shooting or trapping.

Second—By suffocation in burrows.

Third—By poisoning their food supply.

Shooting or Trapping.

This may be used as an auxiliary to other methods. Shooting is best accomplished through the use of shot guns carrying No. 6, 7 or 8 shot,

rather than with rifles. Trapping is best done with animal chain traps, by placing the traps in the run-way of the squirrel. Much skill is required in the use of either method.

Suffocation in the Burrows.

(a) By flooding the village with water.

(b) By the introduction of poisonous gases into the burrows.

(a) *Flooding.*—*Drowning* has been found applicable only in certain districts where the necessary water is to be had, as from irrigation ditches. This has proven a most effective method and should be used wherever local conditions permit.

(b) *Poisonous gases.*—This method includes the use of such agents as sulphur dioxide, hydrocyanic acid and bisulphide of carbon. Sulphur dioxide and hydrocyanic acid gases, while very effective, can not be economically employed, since they must be prepared on the ground, and the apparatus would be difficult of transportation. Bisulphide of carbon as a gaseous agent is ideal and will be discussed at length.

This material is obtained commercially in the form of a liquid and is so transported. In use it is vaporized or by ignition is converted chemically into other gases. It is very effective, but presents several objections. It is costly, must be kept in tightly closed containers, can not be shipped by express, is very inflammable, and under certain conditions may explode. During the dry season if “exploded” in the burrow there is danger of igniting anything of an inflammable nature near, and a serious fire may result. It is more dangerous than gasoline and should be handled in the same way, but with more care. When proper precautions are taken the risk is slight. Its advantages result from the readiness with which it may be converted into a poisonous gas or gases when introduced into the squirrel burrow. Here it diffuses and destroys life rapidly and effectively. It is used most satisfactorily during the rainy season when the damp ground, as it is said, “holds the gas.” It is especially valuable at this season in that it may be used during that period when green food is abundant, at which time the squirrel will take little poison in the form of grain. It may be used with success at any season, provided the danger of fire is remembered and the ground is sufficiently moist to hold the gas.

There is a tendency on the part of many farmers to use bisulphide without ignition, claiming this to be the most effective method. Undoubtedly the unexploded gas when it permeates the burrow will kill, and it has the advantage that a large portion of the gas evolved remains confined to the burrow and there is little waste. Exploded in the ordinary way, a considerable quantity of gas escapes into the open air, but when the process is examined more closely several facts seem to indicate that the latter method is more economical and just as effective. The ignition produces a violent chemical reaction and as a result sufficient oxygen from the air combines with the carbon and sulphur elements to produce a volume of gas three times that the original bisulphide would produce on evaporation. The gases produced, carbon dioxide and sulphur dioxide in the proportion 1 to 2, seem just as effective as bisulphide of carbon, and the method is superior in that the explosion produced drives these gases deeply into the burrow.

The quantity to be introduced into each individual burrow cannot be accurately determined since the capacity of a burrow or the village of which it may form a part can not be previously ascertained. Ordinarily, about 60 c.c. or two ounces should be sufficient to fill a village composed of several communicating burrows. Roughly, this amount of carbon bisulphide when ignited will produce about one and three-fifths cubic feet of gas, or about twelve gallons, and its effect will depend upon the percentage strength after admixture with the air in the village. It is probable that too little carbon bisulphide is frequently used, for many squirrel burrows contain blind ramifications which the gas does not reach and if occupied by squirrels at the time might permit their escape from asphyxiation. This probably accounts for the reappearance of the squirrel in many villages which were apparently thoroughly treated.

It may be stated then in favor of non-explosive methods that all gas evolved is confined to the burrows with little waste. That the danger of explosion to the operator and the liability of fire to the surrounding area is removed. That the poison is more rapidly distributed and the cost of labor slightly lessened. While ignition produces a much increased volume of gas, with the production of sufficient explosive force to drive the gas throughout the burrow. Further, the appearance of the gas in the openings of the adjoining burrows is readily seen and helps to determine the area the gas has affected.

A common method of applying bisulphide is as follows: From one to three days prior to the application of the poison all squirrel burrows in the area to be poisoned are well stopped with earth. The holes found opened, on arrival of the poison squad will indicate to them the burrows containing squirrels. Two men working together can apply the poison most rapidly and economically.

One man is provided with a supply of "waste," "sacking" or other absorbent material, divided into a number of small balls about half the size of the fist. The bisulphide is carried in an ordinary one gallon oil can, and refilled from time to time from a supply kept in a cool place out of the sun. He is supplied with matches. His "pardner" carries a mattock or long handled shovel. On arrival at an opened squirrel burrow, a ball of "waste" is saturated with two ounces of bisulphide, dropped deeply into the burrow and then a match applied. After a moment's time the man with the shovel stops with earth this burrow, and all other burrows near from which the gas escapes. On subsequent inspection of the field all opened burrows will indicate holes lacking effective treatment.

Poisoning the Food Supply.

The poisons commonly used for this purpose are phosphorus, potassium cyanide and strychnine. They will be considered separately.

Phosphorus.—In the hands of many this poison has proven very efficient but the care required in handling and the danger from fire restrict its use. In a limited way it may be found effective, but can not be recommended for general work.

Potassium Cyanide.—The deadly character of this poison and the extreme rapidity with which the acid of this salt acts is generally known and it has been much used, but in the ordinary strength used

as an eradivative agent this substance on a short exposure to the air becomes inert. When freshly prepared and exposed at once it is reported very effective, a fact which many farmers appreciate, but the great danger to life when handled carelessly and the rapidity with which its effects disappear on exposure remove any value it may have for general eradivative work.

Strychnine.—Probably no other poison has been used so extensively and this alone is indicative of its great value. This poison presents but one objectionable feature; in use it passes out of the direct control of the operator and being destructive to all forms of animal life will kill whenever a sufficient quantity is ingested. For squirrel eradication it is ideal. It is small in bulk, easily transported, handled without danger, is comparatively cheap and may be readily mixed with all forms of food. Exposed during season, it is probable that seventy-five per cent of all the squirrels may be destroyed by it, and from an economical point of view the success of a squirrel eradivative campaign will depend upon the thoroughness with which this poison is used.

The pure alkaloid should not be used. Some soluble salt of strychnine, as the sulphate, preferably, should be selected.

To be effective it must enter the circulation, and to reach this end must be mixed with the food. Such food should be obtained in the natural state and require little modification in the manufacture of the poison. It should be cheap, readily purchased and easily divided. Further, it should be objectionable to birds and capable of such disposition that sheep and cattle could not obtain it in poisonous quantities. Practical experience has demonstrated that some form of grain, as wheat, oats or barley the more nearly conforms to these requirements, but when local conditions provide a special form of food acceptable to squirrels, such as oranges in the orange belt, etc., such material may be poisoned with strychnine and used to advantage.

Wheat is an excellent base for the application of the poison and most acceptable to squirrels. It has been widely used, but the fact that it is readily eaten by birds has resulted in the destruction of quail and doves, and although their value to the farmer is not generally admitted, a poison causing such destruction can not be recommended. Further, its comparative cost must be considered.

Red oats are cheap and apparently readily eaten by squirrels. A good medium for the poison, and recommended, provided the statement that it is rarely eaten by birds is true.

Barley.—This cheap and widely known cereal has been extensively used in eradivative work, and is said to be most acceptable to squirrels. Many farmers have noted, and Mr. Piper of the United States Biological Survey has stated, that whole barley threshed but retaining the rough husk will not be eaten by birds, and this important fact is insisted upon in his use of the grain. In addition, its cheapness, the ease with which poison may be applied, and its conformation to other requirements recommend it. The formula for its preparation, suggested by Mr. Piper, is as follows:

FORMULA.

Whole barley -----	20 pounds
Starch paste -----	1 pint
Strychnine sulphate -----	1 ounce
Saccharine -----	1 dram

The barley is placed in a receptacle large enough to permit thorough stirring (as a wash tub). One pint of water is then brought to a boil and sufficient laundry starch (about two tablespoonfuls dissolved in a little cold water) is slowly added to form, when well cooked, a paste about the consistency of cream. The strychnine (first powdered, if in crystals) and the saccharine are now added to the hot starch paste, and the mixture well stirred until thoroughly dissolved. While still hot this is poured over the barley, mixed well, and the whole put aside for several hours before using.

This formula is recommended because of its simplicity, cheapness, and effectiveness. Experimentally, thirty kernels in the cheek pouches of squirrels rapidly proved fatal. In this proportion, one ounce of strychnine to twenty pounds of grains seems proper.

Many farmers arrange this proportion to suit their individual desires, some using a proportion of one ounce to sixteen or fourteen, or even twelve pounds of grain. Poisoned wheat containing one ounce to thirty pounds has, in the hands of many, proved very effectual. A poisoned grain requiring the fewest number of kernels to produce death should be the object, since this would prove the most economical, but it is possible a very concentrated solution of poison may make the grain so bitter squirrels will reject it. The proportion one ounce to twenty pounds seems most appropriate.

In the ordinary process of manufacture the grain is merely coated with the poisonous material and dried, certain ingredients, as egg albumen, or starch being added to cause the poison to adhere and to form a so-called moisture-proof coating. It is questionable whether the poison ever really penetrates the kernel, nor is this essential.

Grain poisoned with strychnine and placed in proper containers will retain its poisonous character and remain effective for an indefinite period; exposed in the open where the ground is perfectly dry it will suffer little deterioration, but heavy dews or even slight rains may remove the greater portion of the strychnine and destroy its value. For this reason its use is limited to the dry season, and fortunately this coincides with the period when green food is scarce. The squirrel seeking food for daily consumption or his winter store will readily take grain, and this is the period of maximum effectiveness.

DISTRIBUTION OF POISONED FOODS.

In placing the poison it must be remembered that we have to deal with a most cunning animal who quickly becomes suspicious when he finds food of a form and in a place new to his experience. He must be deceived. For this reason the food should receive little modification in its manufacture, and if made bitter by the poison, it should be rendered more attractive by adding some sweetening agent. It should be scattered where the squirrel is accustomed to find food, and will probably be found most efficient if placed early in the morning, between the hours of 3 A. M. and 7 A. M.

When the poison fails to destroy, the cause must be carefully sought; the food may be unattractive, bitter or badly prepared; again, and more often, failure may be due to the method of application; the food may have been placed in such a way the squirrel is made suspicious, or other foods such as green grain or grass may be abundant and more attrac-

tive; or rain may have fallen and washed off the poison. No poison should be condemned absolutely until these points have been gone over.

It is a fact, proven experimentally many times but not generally known, that less poison is required to kill a squirrel when the food is stored in the cheek-pouches than when taken directly into the stomach. Poison is more slowly absorbed by the stomach, and some of it is destroyed, but it is rapidly absorbed from the cheek-pouches, where from two to four times less poison is required to kill. Where thirty kernels of grain will quickly destroy life in the cheek-pouches, sixty or ninety or more by the stomach may produce only a few convulsions and be recovered from. This fact should be remembered in placing poison, for by scattering the grain, a few kernels here and there near the burrow, the squirrel is induced to store the grain temporarily in the cheek before a sufficient quantity is obtained for a meal.

In conclusion, it may be said that the market affords a multitude of excellent prepared foods for squirrel destruction, the majority of which depend upon strychnine as the poisonous principle, but a properly prepared "home-made" poison is just as efficient, and generally is more economical.

THE STORY OF PLAGUE.

By RAYMOND RUSS, M.D.

Once we know the cause of disease and the manner in which it is spread, its eradication becomes a comparatively easy matter. Without definite knowledge of these facts we aim wildly and use many kinds of ammunition which have no effect upon the forces of the enemy. When it is known where we should look for a certain contagion, and when we come to a full appreciation of its carriers, we can put into action the accumulated knowledge which preventive medicine has given us, for it is to the great subject of medicine that public health must always turn, and if the basic principles are not known the task of the sanitarian is difficult, irksome, and almost fruitless.

There was probably no disease in the middle ages that was so much written about as plague. This was because of two great reasons, that it came where it was the least expected and it seldom or never in those days struck without killing. In some parts of France, in the sixteenth century, men thought the Jews had poisoned everything and ran them down and tortured and maimed, and even killed them; some said that the beggars were accountable for the spread of plague, and they were driven out of the country. There were many fantastic notions and no end of wise deductions.

Ambroise Paré, the great French surgeon, says "The plague is a disease coming from the wrath of God, furious, sudden, swift, monstrous, dreadful, contagious, terrible, savage, and most cruel; the mortal enemy of the life of men and of diverse sorts of beasts, plants and trees." He had good reason to speak in this superlative way, for he passed through the great pestilence when it swept the streets of Paris, and but few were left to tell of its terrific inroads. Those who have read Pepys' Diary know of the many references in that remarkable book to the great London plague and of the havoc and destruction which it wrought. It was generally thought that the disease was due to

infection and corruption of the air, and many examples were cited to prove the truth of this assertion. Foul vapors from lakes, marshes, muddy pools, pipes and drains were supposed to give rise to this disease, and, strange to say, the belief has been universal up to a very short time ago that malaria also was caused in this way. When our knowledge is indefinite and the great truths of the causation of a disease not known, we are prone to indulge in all kinds of fantastic notions, and future generations will probably think that some of our ideas concerning cancer at the present day are as chimerical as those which our ancestors entertained as to the origin of plague, malaria, and typhoid fever. The philosopher Empedocles found an opening in the earth among the mountains from which were emitted foul gases, and when he had this opening closed the plague was driven out of Sicily; there are many other examples cited to show that the theories which were entertained, could be backed by concrete instances.

Paré, in his "The Book of the Plague," states particularly that the magistrates of towns must catch and kill all the dogs and cats, lest they carry the plague from one house to another, but he says nothing about the rats. Hippocrates favored the purification of the air by fires and stated that the great plague in the city of Athens was driven away by making hot fires at night, not only in the houses, but upon the streets as well.

Levinus states that when the plague was at Tournay the soldiers, in order to prevent its spread, loaded their cannons with powder and fired them every evening and at daybreak; the explosion and the strong smelling smoke, it was said, drove the disease away.

Paré in speaking of the results of plague says, "Nor need I here describe what we all know only too well: how the deserted towns became like fields and you could see grass growing in the streets, husbandmen leaving their cottages and fruit-trees, land untilled, flocks lost and scattered far and wide, and men, who chanced to meet, running away from each other; a sure sign of the heavy hand of God." In another place he states: "Out of an infinite number of such cases as we often see, take that story of the woman whose husband and two of her children died, and she found she too had the plague, and began to put herself into her shroud, and was found half shrouded, and the needle and thread still in her hand. In another case a strong, hearty man was seized and went to the graveyard, and had his grave dug in his own presence and before it was done he died on the edge of it."

The poet Lucretius is authority for the statement that the plague once raged so furiously about Athens that many people became so frenzied that they threw themselves into the water and were drowned.

These are some of the accounts of the plague in early times, and it was no wonder that when the disease broke out afresh in Bombay in 1898 the home government could hardly comprehend its seriousness, for families were found dead, streets were deserted and business was at a standstill. At first large sums of money were absolutely wasted on disinfectants and many lives were lost because the proper precautions to be taken were not known. The lack of medical knowledge concerning the disease was appalling. The first outbreak was followed by the establishment of government laboratories devoted to the study of plagues which were placed in the hands of competent bacteriologists.

Observation developed the suspicion that the rat was the chief factor in the disease, and as one outbreak followed another this suspicion became a certainty. It had long been observed that when dead rats were found about a house, human plague followed unless the house was vacated. It was also found that the infection hung about these huts, and that persons who visited them at some later time might acquire the disease. Finally it was generally accepted that plague was a rat disease and the saying "No rats, no plague" became a byword. But how was the disease conveyed from rats to man; that was the prime question which must be settled.

The Indian plague commission in 1898 came to the conclusion that plague infection always entered through the skin, and there were many reasons for this deduction. About the same time a Frenchman made experiments which would seem to place the blame upon the flea, but these experiments were neither complete nor convincing. The idea, however, was elaborated by an officer in the Indian Medical Service who began making more thorough investigations, and he found that fleas upon rats were of a different species than those on men, but that if a rat died, the fleas which infested him would quickly migrate and would readily bite a human being. The fact was also discovered that fleas fed on animals who had died of plague, contained in their stomachs plague germs, and that when guinea pigs were exposed to the bites of these fleas they quickly developed plague and died. This work was followed by a second plague commission of the British Government, who reviewed carefully and confirmed the previous results before commencing investigations along new lines.

There were two theories of human infection at this time that were universal, and these had to be disproved by experiment before much progress could be made; one was that rats might soil food by their excreta, and that the plague could be conveyed by people eating such contaminated food. To disprove this rats were fed on the carcasses of other rats who had died of plague and it was found that only when a very large dose of infectious material was given, did the disease result. Further refutation of the theory came from the fact that in the thousands of autopsies performed on rats which had died of plague in the city of Bombay, buboes (plague swellings) were always found in the glands connected with the skin and were not present in the abdominal cavity, as would have been the case if the disease had entered through the stomach or intestines. Again, it was thought that floors of houses might be infected by rat excreta and that disease might enter through the soles of the feet, as most of the inhabitants of India go barefooted in their dwellings. This was easily disproved, for it was found that animals who were penned on floors thus contaminated, did not acquire the disease unless actual pools of plague culture were present.

The flea idea had many opponents, and arguments were not lacking against it. It was, for instance, pointed out that infection of others in the hospitals was not common, although there were plenty of fleas present. It was later found that the human flea was of a different species from the flea infesting rats; and that while human fleas are not found on rats, the rat flea will take up his abode on man at times. The flea remains upon the body of the rat until that animal is cold in death, when he immediately forsakes him for the first warm-blooded

animal which he may encounter, and he does not hesitate to bite man. In Bombay there were many examples to prove this fact. In one house, where several hundred people lived, it was found that the rats died rapidly and the living rats disappeared. Two days later the people of the tenement were so bothered with fleas that they were obliged to leave their rooms. When these people were examined the greater part of them were found to be covered with rat fleas and some of these fleas had plague germs in their stomachs.

The work of this Indian Plague Commission was remarkable, and the experiments which were planned, in order to prove these basic facts, most ingenious and interesting. On this point Bannerman says: "It having been proved that rat fleas are in certain circumstances found on man, it became necessary to determine whether they can transmit plague itself. A glass box was made, large enough to contain a couple of wire cages in which rats or other animals might be confined. The glass box was covered in by muslin, so as to make it insect proof. Each animal cage stood in a tray filled with sand to absorb the discharges; so that no possible communication could take place except through the air, or by some insect capable of passing from one cage to the other. Into one of the cages was put a rat artificially infected with plague, and along with it ten to twenty rat fleas. When this rat died a healthy one was placed in the other cage contained within the same glass case. Eight hours after, when its body was cold, the corpse of the first rat was removed and examined to make quite certain that it had really died of plague. If the healthy rat in the second cage died subsequently, it was also examined to determine the cause of death. When the experiment was performed as above described with English rats, especially imported so as to insure that they had not previously been exposed to plague infection, in eleven out of sixteen experiments the healthy rats contracted plague. To exclude the possibility of aerial infection, another series of trials was made by putting fleas from plague rats into a glass box similar to the above, but containing only one healthy rat. In eight out of thirteen experiments made with English rats, the flea-bitten rat died of plague."

Having ascertained in this and other ways that it is an easy matter to infect susceptible animals by means of fleas taken from plague-infected animals, the next step was to find out whether close contact of infected animals with healthy ones was, in the absence of fleas, capable of starting an epizootic. For this purpose experimental rooms were utilized. These were constructed in such a manner as to be flea proof, and all animals placed in them were carefully searched to make sure that no fleas were introduced accidentally. Fifty guinea pigs were put into one room measuring seven by six feet, and then ten others artificially infected with plague were added. The room was purposely not cleaned out, so that in a few days the animals were living in most unsanitary conditions. As the infected guinea pigs died of plague the bodies were left for twenty-four hours before removal, so as to afford every chance for contagion to play its part. Yet not one of the fifty healthy animals died. Many other similar experiments were performed in that and subsequent years, always with the same result; not a single healthy guinea pig contracted plague.

A parallel series of experiments were conducted in rooms which were kept well supplied with rat fleas. One such may be cited. Five plague-infected guinea pigs were placed in a room; in three days all had died of plague. After the last of the bodies had been removed, twenty-five healthy guinea pigs were put in and allowed to run about freely. An epizootic at once broke out among them, and all had succumbed in a fortnight. Fleas were present in great numbers throughout this experiment. These fleas, on being transferred to a room where fifty guinea pigs had been living for three weeks, started an epizootic among them which in six weeks killed them all from plague.

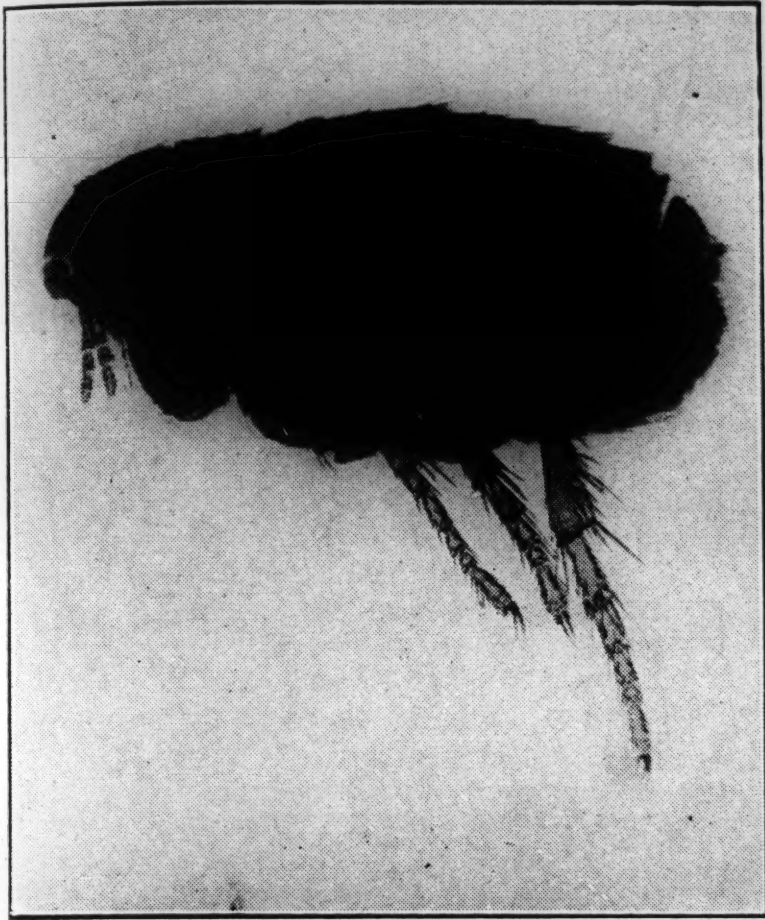
At the beginning of the plague trouble in San Francisco in 1907, a well known physician said to the writer that he believed the fleas had something to do with the spread of plague in that city; that he and his family had lived there for years and that there had never been a time when fleas were so numerous as they were then. Very fortunately the final report of the Indian Plague Commission, which proved the transmissibility of plague by the flea, was published a few months later and immediately Dr. Rupert Blue and his co-workers began to put into operation these great truths with the result that San Francisco was very soon free of this dreadful disease.

Space does not permit us to dwell further upon the interesting researches of the British Plague Commission. Suffice to say that these many trained observers attacked the problem from every possible standpoint, and their experiments were submitted to most searching inquiry; they established the fact, and established it beyond controversy, that the flea is the means of conveying plague from one animal to another, and that habitations are dangerous because of the presence of these infected fleas, and that the soil, the air, weather conditions and many other factors which were supposed to have had bearing upon this infection, are of no import, except indirectly. The great work begun by this Commission has been continued in San Francisco by Dr. Rupert Blue and his earnest assistants, and the labors of McCoy, Rucker, Mitzman and Wherry have added enormously to our accurate knowledge of the disease. We now know that plague is quite general among the ground squirrels in certain sections of California and we fully realize this danger.

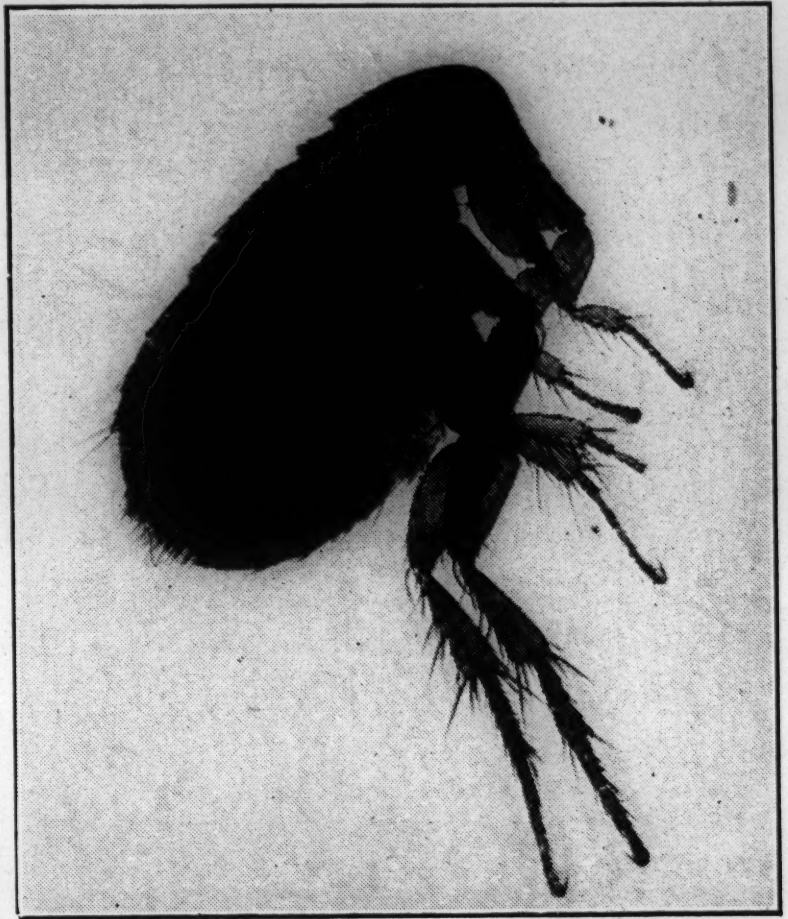
The importance of these epoch making discoveries in the control of this dreadful scourge can hardly be estimated. When plague now appears in a community the sanitarian knows just where to strike; there is no more wasted ammunition; he is not fighting in the dark with an intangible foe, but it is an open, direct warfare. The sanitarian knows that his enemy is the rat and that plague is a disease of rats and only incidentally a disease of man. He knows that infection is carried from the rat to man by means of the flea (except in the pneumonic type) and so the problem becomes a comparatively simple one. At all times he must control the rat population and protect the public from its ravages. The ways of doing this are well known to every citizen of San Francisco who passed through the plague campaign. It should be remembered that if it had not been for animal experimentation, and the deductions which these careful observations made possible, we would still be groping in the dark in our efforts to eradicate one of the greatest pestilences which has ever befallen the lot of human kind.

THE FLEA.

The illustrations following demonstrate that all fleas look alike to most of us, simply because we do not study them. There are as many evidences of individuality among the members of the flea family as



1. PLAGUE FLEA OF INDIA.



2. THE COMMON DOG FLEA.

among members of the human family. The human flea (*Pulex irritans*, No. 3) probably does not serve as the carrier of plague to man except in rare instances, although experimentally it has been proved capable of doing so. The same thing is probably true of the cat and dog flea (*Ctenocephalus canis*, No. 2). The common rat flea of temperate climates (*Pulex Ceratophyllus fasciatus*, shown on cover) seems better adapted for some reason to the needs of the plague bacillus. It is the rat flea which is most abundant in California towns, and was probably the chief agent in spreading plague among human victims in San Francisco. The rat flea of tropical countries, commonly known as the "plague flea of India" (*Pulex pallidus vel cheopis*, No. 1), is the one chiefly concerned in the transmission of plague throughout the infected warm countries.

No. 1. *Pulex vel cheopis*.—One of the rat fleas. Most abundant in the tropics. Has been found



3. MAN'S FLEA.

man in San Francisco. Used extensively by British commission in India to prove the transmission of plague by flea. A flea may take as many as 5,000 plague germs into its stomach at one feeding upon a plague rat.

No. 2. *Ctenocephalus canis* (Curtis).—The dog and cat flea of all climates. Often found on man in California. It is the intermediary host of the *Cysticercus* of tapeworm (as in the case of *Dipylidium caninum*), but has been found unadapted to the transmission of plague in laboratory experiments.

No. 3. *Pulex irritans*.—The human flea of all climates. Often found on domestic animals, and is able to live with difficulty for a short time on rats and squirrels.

Laboratory experiments have shown that this flea can jump vertically $7\frac{3}{4}$ inches, and horizontally on wood 12 inches. The life cycle of this flea in California is approximately as follows: Egg stage, 8 days; larva, 50 days; pupa, 32 days; adult life in captivity, 4 to 6 weeks.

(See illustration on cover) *Ceratophyllus fasciatus*.—One of the rat fleas. Most abundant in temperate climates on the common brown rat. Has been found on man in California. Experimentally this flea has been used to transmit plague from rats to squirrels. Specimens of this flea have been kept alive 104 days.

WHEN COMMERCE AND HEALTH UNITE.

By WILLIAM F. SNOW, Secretary California State Board of Health.

Rarely are commerce and health both served by a public health measure. All too frequently such measures are necessarily enforced at great expense and inconvenience to industries and individuals. The Legislature of 1909, however, framed a law the thorough enforcement of which will prove equally advantageous to both interests. This is the "Act for the extermination of rodents," passed March 13, 1909.

This measure was passed for the protection of the public health of California, and in the interests of unimpeded commerce and traffic with other states and nations, but the application of its provisions to the extermination of the common ground squirrel has the added advantage of removing a most serious and costly enemy of the California farmer and fruit grower.

The text of this law is as follows:

SECTION 1. It shall be and is hereby declared to be the duty of every person, firm, copartnership, company and corporation, owning, leasing, occupying, possessing or having charge of or dominion over, any land, place, building, structure, wharf, pier, dock, vessel or water craft, which is infested with rats, mice, gophers or ground squirrels, or as soon as the presence of the same shall come to his, their, or its knowledge, at once to proceed and to continue in good faith to endeavor to exterminate and destroy such rodents, by poisoning, trapping, and other appropriate means.

SEC. 2. The state board of health and inspectors appointed by such board, and local health officers and inspectors appointed for the purpose, as hereinafter provided, shall have authority, and shall be permitted to enter into and upon any and all lands, places, buildings, structures, wharves, piers, docks, vessels and water craft, for the purpose of ascertaining whether the same are infested with such rodents and whether the requirements of this act as to the extermination and destruction thereof are being complied with; *provided, however*, that no building occupied as a dwelling, hotel or rooming house, shall be entered for such purpose except between the hours of nine o'clock in the forenoon and five o'clock in the afternoon of any day.

SEC. 3. The board of supervisors of each county and the city council or other governing body of each city and county, city and town, whenever it may by resolution determine that it is necessary for the preservation of the public health or to prevent the spread of contagious or infectious disease, communicable to mankind, or

when such board shall so determine that it is necessary to prevent great and irreparable damage to crops or other property, may appropriate moneys for the purchase of, and may purchase poison, traps and other materials for the purpose of exterminating and destroying such rodents, in such county, city and county, city or town, and may employ and pay inspectors, who shall have authority to and shall prosecute such work of extermination and destruction, under the direction of such board, or of the local health officer, or board of health, on both private and public property, in such county, city and county, city or town.

SEC. 4. Whenever any person, firm, copartnership, company or corporation, owning, leasing, occupying, possessing or having charge of or dominion over, any land, place, building, structure, wharf, pier, dock, vessel or water craft, which is infested with such rodents, shall fail, neglect or refuse to proceed and to continue to endeavor to exterminate and destroy such rodents, as herein required, it shall be the duty of the state board of health, its inspectors and the local board of health and health officer, at once to cause such nuisance to be abated by exterminating and destroying such rodents. The expense thereof shall be a charge against the county, city and county, city or town, wherein the work is done, and the board of supervisors or other governing body shall allow and pay the same. Thereupon, the clerk of such board shall file in the office of the county recorder a notice of such payment, claiming a lien on such property for the amount of such payment. Any and all sums so paid by such county, city and county, city or town, shall be a lien on the property on which said nuisance shall have been abated, and may be recovered in an action against such property, which action to foreclose such lien shall be brought within ninety days after such payment, and be prosecuted by the district, city or town attorney, in the name of such county, city and county, city or town, and for its benefit. When the property is sold, enough of the proceeds shall be paid into the treasury of such county, city and county, city or town, to satisfy such lien and the costs, and the overplus, if any there be, shall be paid to the owner of the property, if known, and if not known shall be paid into court for the use of such owner when ascertained. When it appears from the complaint in such action that the property on which such lien is to be foreclosed is likely to be removed from the jurisdiction of the court, the court may appoint a receiver to take possession of the property and hold the same while the action may be pending or until the defendant shall execute and file a bond, with sufficient sureties, conditioned for the payment of any judgment that may be recovered against him in the action and all costs.

SEC. 5. Any violation of the provisions of this act shall be deemed a misdemeanor and shall be punishable as such. [Statutes of 1909, page 311.]

The greatest difficulty in making this law effective is the lack of concerted action among the farmers themselves. In order to overcome this the following plan was announced in August, 1910:

PLAN FOR ENFORCEMENT OF THE LAW.

"The State Board of Health, in conference with the United States officers, has determined upon the following plan of procedure, as promising efficiency and fairness in enforcing the law for the extermination of rodents:

1. County boards of supervisors to be formally requested to enforce this law, and to take all necessary measures to fully notify all land owners in their respective counties of their intention to enforce it.

2. Through coöperation with the United States Public Health and Marine-Hospital Service, expert advice to be provided on the best and most inexpensive methods of exterminating squirrels in the various portions of each county.

3. Property owners to be given until January 31, 1911, to exterminate the squirrels on their property.

4. Upon that date property owners who have not complied with the law, or upon whose property evidence of squirrels is found, to be warned by the supervisors and granted one month extension of time.

5. On February 1st a final inspection to begin. All property not found clear of squirrels to be condemned, and officers specified by the supervisors to be instructed to immediately begin the extermination of the squirrels remaining at that time.

6. This final work of extermination to be done in accordance with the law, providing that all expenses shall be paid from the county and city treasuries and charged as liens against the property concerned.

The State Board of Health believes that these plans will provide for simultaneous and effective action among land owners."

Owing to the unusual prolongation of the dry autumn weather, followed by the recent period of floods and high water, conditions have not been favorable for the carrying out of this schedule within the dates specified. Consequently, the date for the final inspections to

begin has been changed to April 1, 1911. The importance of doing this work well is indicated in the following letter which has just been received:

TREASURY DEPARTMENT,
WASHINGTON, February 14, 1911.

Dr. William F. Snow, Secretary of the State Board of Health of California, Sacramento, Cal.

DEAR DOCTOR SNOW: As stated to you in previous correspondence the conference of State and Territorial Boards of Health will be held at San Francisco June 24, 1911. The members of this conference have been in the past, and are now, much interested in the plague suppressive measures that have been carried on in California during the past few years by this Service, in coöperation with the health authorities of the State of California, and of the various cities in the region of San Francisco Bay.

The representatives of the various states who will attend this meeting, will undoubtedly avail themselves, while in San Francisco, of the opportunity to study the methods in use for the suppression of plague.

It has always been the policy of this Service, when managing outbreaks of epidemic disease, to work in coöperation with the authorities of the State in which the outbreak has occurred, and to require that the State in which the work is done bear its just proportion of all expenses. That this policy is the correct one, is evidenced by the fact that when appropriations are made by Congress for the continuance of the work of the Service, the members of the committees of Congress, which have to do with appropriations, invariably require detailed information as to the amount of money that is being expended by the State or local authorities who are coöperating with the Service, and have on several occasions shown a manifest disposition to refuse to continue appropriations unless a just proportion of the expense is borne by the other parties interested. In San Francisco, as you will remember, a large collection was taken to bear the city's share of the expense necessary to eradicate plague from the city. Oakland appropriated a large sum, and also, to a less degree, Berkeley and Alameda. New Orleans, in the various outbreaks of yellow fever that have occurred has always borne a large share of the expense, and the other states in which the disease has appeared have furnished their just proportion of either men or money or both. From the reports that have been received from Surgeon Rupert Blue it appears, that there is a possibility that the extent to which the infection of plague among ground squirrels has spread will be definitely known within the next six or seven months. In accordance with the plan of operations now being carried out, it is the intention, as soon as the zone of infection has been definitely ascertained, to request your board to furnish an adequate number of men and a certain amount of money, so that, in coöperation with the Service, a careful and thorough campaign of squirrel eradication may be carried out with a view to entirely eliminating the plague squirrel from the infected area of the State of California. The benefits to be derived from the eradication of squirrels from an area of over 20,000 square miles will not consist alone in the removal of a menace to public health, but will result in a large annual saving to farmers and others engaged in ranching and agricultural pursuits.

It has been suggested that, in addition to the advantages mentioned, it would be a source of gratification to the people of California, if, prior to the opening of the Panama-Pacific Exposition, in 1915, the announcement could be made that plague has been eradicated from the State, or confined to so small an area as to be a negligible factor.

I have to recommend therefore that, in view of the foregoing, you urge the importance of providing a sufficient amount of funds to carry on this work in connection with the Service.

The Service is now expending between \$14,000 and \$15,000 per month in this work in its various branches.

It is true that other states are benefited or protected by this expenditure, yet the primary and chief benefit is felt by the State of California, and if there is no adequate appreciation of this fact, there will be difficulty in the future in continuing the Government's activities on the present broad lines. The proportion of expense now paid by the State of California is not as large as it should be, and while a definite amount is difficult to determine, provision should be made by the State for the expenditure of at least \$6,000 or \$7,000 per month during the next two years, it being understood that the county authorities and the owners of ranches will also materially aid.

Respectfully yours,

WALTER WYMAN, Surgeon-General.

The extent to which plague has spread among ground squirrels has been determined by most exhaustive and trustworthy investigation. More than three hundred and twenty thousand squirrels have been killed and shipped in sealed cans from the various parts of the state to the

plague laboratories in San Francisco, Oakland, and Los Angeles. These squirrels have there been dissected for evidences of plague, and experiments have been made in each suspicious case to prove beyond question that the squirrel had genuine plague. Four hundred and eleven (411) squirrels have thus been proved plague infected. Thirty-four (34) counties are represented by the squirrels examined but only *eleven* of these show infected squirrels. These counties are Contra Costa, Alameda, Santa Clara, San Benito, Santa Cruz, San Luis Obispo, Merced, Monterey, San Joaquin, Stanislaus, and Los Angeles, but Contra Costa and Alameda counties are the only ones showing a large number of squirrels and infected places.

Many valuable scientific facts have been worked out in connection with these investigations, although these are for the most part not of interest to the general public. It is important, however, for those of us who live on the Pacific coast to realize that plague among the squirrels is like a flickering fire near a powder magazine—it may die out by itself, but everybody knows how great are the chances of an explosion if the fire is not put out. In the case of plague, the danger does not lie in a spread of the disease direct from squirrels to men, but in a transfer of the disease back to rats, which in their invasion of cities and towns may transfer the disease to the homes of the people, and through the final agency of the flea to the people themselves. The logical thing to do, of course, is to kill the squirrels so far as may be practicable in the infected counties, and to continue the examination of a sufficient number of rats from each city in the infected area to determine as a certainty that plague has not again appeared among them. The latter measure can be carried out in the future as in the past by the Federal and State officers, but the former measure—the killing of the squirrels in an attempt to eradicate plague—can only be accomplished by the concerted and continuous efforts of the farmers and landowners themselves.

It naturally occurs to the average citizen on first thought that all this investigation of rats and squirrels is expensive and a needless precaution among an enlightened people; that there is ample time to institute active measures when plague actually breaks out among human beings. But plague is a dangerous disease.

It is only by frequently trapping and examining specimens of the rat population of the cities and the squirrel population of the contiguous counties that have been infected, that we may authoritatively assure our anxious sister states and the nations with whom we have large dealings, that there is no need for a commercial quarantine against our exports.

Even if some farmers and city residents are indifferent to the possible danger to their own lives, in pursuing a policy of neglect of these precautions, this necessity of insuring freedom from the expense and inconvenience of commercial quarantine supervision should rouse them to adequate coöperation. The prevention of the introduction of tropical diseases into California depends upon the extent to which our citizens may be enlisted in an effective "pulling together" in the fight against them.

The public health laboratory for the study of disease and the inspection machinery necessary to apply the results of the laboratory work are costly, but the commerce and welfare of our country demand the expenditure. The best men and the best equipment are the cheapest

in Public Health work as in any other business. The owner of a great business enterprise selects for his manager some one who has made good, and then provides him with the funds and the authority which he requires to successfully conduct the enterprise. If this business happens to be a creamery or cheese industry and the manager recommends the purchase of certain kinds of bacteria which are to be imported to ripen or flavor the products, the directors do not doubt the agency of these invisible organisms in producing a marketable product, they pay the bill and hold their manager responsible for his results. If this same manager points out to them that through the agency of other unfavorable organisms he is getting poor results, they ask him what is to be done and pay the costs of sterilizing apparatus, disinfectants or whatever else he may recommend. Why? Because they believe their manager knows his business.

In exactly the same sense, health officers are the business managers of the health conservation interests of the citizens. The biological fact that plague is the result of activity of a definite organism growing in the human body is no more wonderful or mysterious as a fact, than that the flavor of a special kind of cheese is due to the growth in the milk or cream of a definite organism. Nor is it difficult to grasp the fact that as the plague germs are circulating through the blood vessels some of them may be sucked into the "stomach" of the flea which is gorging itself with blood. No one doubts that the red fluid with which the flea is gorged is blood, nor that if this fluid is put under a microscope it will show blood corpuscles. Why should any sane person stop here and doubt the reality of the small organisms which are seen in this same blood alongside of these corpuscles, when the magnifying power of the microscope is increased to three thousand diameters? And why should any one doubt that these small organisms may be carried by the flea to the next person bitten and there, in the process of feeding (during which time the flea discharges some of the contents of the "stomach"), be given an opportunity to escape into the blood or lymphatics of this second person through the wound produced in sucking blood? Similar knowledge, based upon the study of yellow fever and the agency of the *Stegomyia* mosquito in transferring the germ of that disease from the blood of one person to that of another, has been applied with brilliant results in the Panama Canal zone, in Cuba, and elsewhere. The time is not far distant when preventive medicine will be recognized as a great coöperative business enterprise, which must be conducted with business methods by trained and competent men.

The following statement of Sir Patrick Manson, relative to the importance of tropical diseases to the United States, is full of significance to the citizens of California and the entire Pacific coast. ".... So far as I know, there are only two or three diseases that are, strictly speaking, confined to warm climates, that is to say, that can neither be acquired in, nor be successfully imported into, nor thrive in, colder climates. These two or three—I might call them non-exportable diseases—are due to 'germs' that live on the surface of the body and are therefore exposed to climatic influences.

"One of the most important factors in the diffusion of disease is the intercommunication of peoples, whether this be by trade, by travel, by pilgrimages, by wars or otherwise. So long as a community remains

isolated or cut off from the rest of the world, so long it is spared many of the diseases of the rest of mankind! In primitive times there was nothing more effective than geographical isolation, but when men began to navigate the seas and to make roads over or through the hills, the protection afforded by these natural barriers was broken down, and diseases hitherto localized became diffused and almost general. Thus cholera and smallpox, and doubtless many other deadly diseases of the Old World were carried to the new, and to a less extent the diseases of the New World were carried to the old. . . . You are about to enter on the great undertaking of opening the Panama Canal. You are in full possession of that great outstanding etiological fact that most tropical disease is insect-borne. I sincerely hope the authorities appreciate this. It is the crux of the situation. It means treasure, it means more than this, it means thousands of human lives; it means success or failure. And when you have made this canal, nay before and while you are making this canal, remember Asia. Do not reciprocate her gifts to you of Cholera and Plague by a return gift in the form of Yellow Fever."

When Dr. Manson made these statements San Francisco had not been visited by fire and plague. Unquestionably California needs an efficient sanitary service and experienced officers. The United States Government has a small nucleus of the men in the Public Health and Marine Hospital Service. As many of these men as can be spared from the quarantine stations have been detailed to picket duty and are posted along the shores of the Pacific at important shipping points in China, Japan, the Philippines, Hawaii, and along the South American coast.

With the opening of the Panama Canal, the outposts maintained in Cuba and along the Brazilian coast will also become of great importance to the protection of the shores of the Pacific. The Federal Government may well maintain this picket line and provide for interstate protection, but it remains for the State to organize its own sanitary corps. In the building up of this corps the interests of commerce and health should unite.

DEPARTMENT REPORTS.

REPORT OF BUREAU OF VITAL STATISTICS FOR JANUARY.

GEORGE D. LESLIE, Statistician.

State Totals and Annual Rates.—The following table shows for California as a whole the birth, death and marriage totals for the current month in comparison with those for the corresponding month of last year, as well as the annual rates for 1,000 population represented by the totals for the current month. The rates are based on an estimated midyear population of 2,488,256 for California in 1911, the estimate having been made by the Census Bureau method with slight modifications.

Birth, Death and Marriage Totals, with Annual Rates per 1,000 Population, for California: January.

	MONTHLY TOTAL.		Annual Rate per 1,000 Population: January, 1911.
	January, 1911.	January, 1910.	
Births -----	2,601	2,488	12.3
Deaths -----	3,192	2,833	15.1
Marriages -----	1,981	1,747	9.4

The birth, death and marriage totals for California in January were all greater than the corresponding totals for the same month last year. In January of each year, moreover, the death total exceeded the births reported, with the marriage total third in order.

County Totals.—The table below gives the monthly birth, death and marriage totals for the principal counties of the State, the list being limited to counties having a population of at least 25,000 by the Federal Census of 1910. Totals are also shown for San Francisco and the

other bay counties (Alameda, Contra Costa, Marin, and San Mateo), as well as for Los Angeles and Orange counties together.

Birth, Death and Marriage Totals, for Principal Counties: January.

County having at least 25,000 Inhabitants in 1910.	JANUARY, 1911.		
	Births.	Deaths.	Marriages.
California	2,601	3,192	1,981
Alameda	282	315	180
Butte	35	42	15
Contra Costa	21	29	13
Fresno	123	77	57
Humboldt	25	24	28
Kern	20	50	34
Los Angeles	622	788	453
Marin	16	26	75
Orange	60	41	68
Riverside	48	50	29
Sacramento	88	114	66
San Bernardino	55	74	48
San Diego	60	104	74
San Francisco	512	616	408
San Joaquin	82	75	43
San Mateo	23	18	33
Santa Barbara	12	35	17
Santa Clara	84	117	59
Santa Cruz	33	37	17
Solano	26	39	8
Sonoma	35	73	37
Tulare	39	26	15
Selected groups:			
San Francisco and other bay counties	854	1,004	709
Los Angeles and Orange counties	682	829	521

City Totals.—The following table shows the birth and death totals for the principal freeholders' charter cities, the list including all chartered cities with a census population of at least 15,000 in 1910. Totals are given likewise for San Francisco and the transbay cities (Alameda, Berkeley, and Oakland), as well as for Los Angeles and neighboring chartered cities (Long Beach, Pasadena, Pomona, and Santa Monica).

Birth, Death and Marriage Totals, for Principal Cities: January.

City having at least 15,000 Inhabitants in 1910.	JANUARY, 1911.	
	Births.	Deaths.
Freeholders' charter cities	1,678	1,951
Alameda	19	24
Berkeley	41	27
Fresno	43	33
Long Beach	24	29
Los Angeles	455	511
Oakland	197	200
Pasadena	26	54
Riverside	26	25
Sacramento	66	69
San Diego	42	77
San Francisco	512	616
San Jose	27	41
Stockton	50	40
Selected groups:		
San Francisco and transbay cities	769	867
Los Angeles and neighboring cities	512	622

Causes of Death.—The following table shows the distribution of deaths in California for the current month, in comparison with the preceding month:

Deaths from Certain Principal Causes, with Proportion per 1,000 Total Deaths for Current and Preceding Months, for California: January.

Cause of Death.	Deaths: January.	Proportion per 1,000.	
		January.	December.
All causes.....	3,192	1,000.0	1,000.0
Typhoid fever.....	36	11.3	13.7
Malarial fever.....	10	3.1	3.2
Smallpox.....	1	0.3	---
Measles.....	4	1.2	1.3
Scarlet fever.....	15	4.7	2.9
Whooping-cough.....	12	3.8	3.2
Diphtheria and croup.....	30	9.4	8.3
Influenza.....	28	8.8	4.5
Other epidemic diseases.....	15	4.7	6.7
Tuberculosis of lungs.....	422	132.2	124.0
Tuberculosis of other organs.....	65	20.4	20.1
Cancer.....	151	47.3	57.7
Other general diseases.....	137	42.9	40.5
Meningitis.....	33	10.3	8.6
Other diseases of nervous system.....	261	81.8	87.0
Diseases of circulatory system.....	508	159.1	166.4
Pneumonia and broncho-pneumonia.....	430	134.7	102.4
Other diseases of respiratory system.....	111	34.8	25.2
Diarrhea and enteritis, under 2 years.....	55	17.2	31.9
Diarrhea and enteritis, 2 years and over.....	20	6.3	10.2
Other diseases of digestive system.....	152	47.6	45.6
Bright's disease and nephritis.....	202	63.3	60.6
Childbirth.....	29	9.1	9.6
Diseases of early infancy.....	87	27.3	31.9
Suicide.....	70	21.9	18.5
Other violence.....	174	54.5	66.0
All other causes.....	134	42.0	50.0

In January there were altogether 541 deaths, or 17.0 per cent of all, from pneumonia and other diseases of the respiratory system; 508, or 15.9 per cent, from diseases of the circulatory system, heart disease, etc.; and 487, or 15.3 per cent, from various forms of tuberculosis. The proportions for pneumonia were each higher than for the preceding month.

Other notable causes of death in January were: Diseases of the nervous system, 294; violence, 244; diseases of the digestive system, 227; Bright's disease and nephritis, 202; cancer, 151, and epidemic diseases, also 151.

The deaths from epidemic diseases were as follows: Typhoid fever, 36; diphtheria and croup, 30; influenza, 28; scarlet fever, 15; whooping-cough, 12; malarial fever, 10, and all other epidemic diseases, 20.

The deaths from the three leading epidemic diseases reported for January were distributed by counties as follows:

TYPHOID FEVER.		DIPHTHERIA AND CROUP.		INFLUENZA.	
Alameda.....	4	Alameda.....	3	Alameda.....	1
Fresno.....	2	Calaveras.....	1	Amador.....	1
Humboldt.....	1	El Dorado.....	1	Butte.....	1
Kern.....	1	Fresno.....	7	Colusa.....	1
Los Angeles.....	5	Humboldt.....	1	El Dorado.....	1
Placer.....	1	Kern.....	1	Imperial.....	1
Riverside.....	1	Los Angeles.....	7	Kern.....	1
Sacramento.....	2	Marin.....	1	Los Angeles.....	4
San Diego.....	1	Riverside.....	1	Orange.....	3
San Francisco.....	8	Sacramento.....	1	Riverside.....	1
San Joaquin.....	1	San Diego.....	1	Sacramento.....	1
San Mateo.....	1	San Francisco.....	2	San Bernardino.....	1
Santa Clara.....	1	San Mateo.....	1	San Diego.....	3
Shasta.....	3	Tulare.....	1	Santa Clara.....	1
Solano.....	1	Ventura.....	1	Shasta.....	1
Sonoma.....	2	Total.....	30	Solano.....	1
Tehama.....	1			Sonoma.....	2
Total.....	36			Sutter.....	1
				Ventura.....	1
				Yolo.....	1
				Total.....	28

Geographic Divisions.—Data for geographic divisions, including the metropolitan area, or “Greater San Francisco,” are as follows:

Deaths from Main Classes of Diseases, for Geographic Divisions: January.

Geographic Division.	DEATHS: JANUARY.										
	All Causes.....	Epidemic Diseases	Tuberculosis (All Forms) -	Cancer	Diseases of Nervous System.....	Diseases of Circulatory System	Diseases of Respiratory System	Diseases of Digestive System.....	Bright's Disease and Nephritis.....	Violence	All Other Causes.....
THE STATE	3,192	151	487	151	294	508	541	227	202	244	387
Northern California	375	29	48	11	46	55	73	26	14	24	49
Coast counties ..	202	12	23	7	37	29	34	14	12	12	22
Interior counties	173	17	25	4	9	26	39	12	2	12	27
Central California.	1,687	78	221	83	153	278	293	114	130	136	201
San Francisco ..	616	18	74	29	48	134	95	33	60	57	68
Other bay counties	388	16	54	29	42	58	70	20	28	33	38
Coast counties ..	206	5	29	7	27	27	32	19	18	8	34
Interior counties	477	39	64	18	36	59	96	42	24	33	61
Southern California	1,130	44	218	57	95	175	175	87	58	84	137
Los Angeles	788	26	151	41	56	134	122	60	39	62	97
Other counties ..	342	18	67	16	39	41	53	27	19	22	40
Northern and Central California.	2,062	107	269	94	199	333	366	140	144	160	250
Metropolitan area	1,004	34	128	58	90	192	165	53	88	90	106
Rural counties ..	1,058	73	141	36	109	141	201	87	56	70	144

REPORT OF PURE FOODS AND DRUGS LABORATORY FOR JANUARY, 1911.

PROFESSOR M. E. JAFFA, Director.

The following is a list of the persons accused, the foods found to be adulterated or mislabeled, and the nature of the offenses, which were included in the reports of the Director of the State Laboratory to this Board for the months of May and June. These persons were afforded an opportunity to be heard before this Board as provided in said act, and after such hearing, the findings of the Director being sustained, these cases were referred to the district attorneys of the several counties for prosecution:

Certif- cate No.	Material.	Violation.	Name of Dealer.	Locality.
1155	Ginger ale ----	Mislabeled. Benzoates --	Borello Bros.	San Rafael
1156	Sarsaparilla --	Mislabeled. Benzoates --	Borello Bros.	San Rafael
1157	Lemonade ----	Mislabeled. Benzoates --	Borello Bros.	San Rafael
1158	Queen Char- lotte	Mislabeled. Benzoates --	Borello Bros.	San Rafael
1160	Vinegar cider.	Mislabeled and adulter- ated. Below standard solids, ash, etc. Arti- ficial colors.....	B. Wagner.....	San Francisco
1161	Sweet pickles -	Mislabeled. Benzoates and saccharin	Mrs. M. E. Reed.....	San Francisco
1162	Chow chow ---	Mislabeled. Benzoates---	Mrs. M. E. Reed.....	San Francisco
1163	Eggs	Mislabeled. Not fresh ---	H. B. Massey.....	Los Angeles
1164	Vanilla ice cream.....	Mislabeled. Low butter fat	Lung Hing Co.	San Francisco
1165	Raspberry ice cream.....	Mislabeled. Low butter fat	Yee Lung & Co.	San Francisco
1166	Syrup, Canada	Adulterated. Low ash---	W. B. Fussell.....	Los Angeles
1167	Powder, yel- low	Adulterated. Coal-tar colors	S. Ishimitsu Co.	Los Angeles
1169	White Pine cough syrup.	Mislabeled. Morphine, chloroform and ethyl alcohol	Weaver's Pharmacy --	San Francisco
1170	Cough balsam.	Mislabeled. Ethyl alco- hol	No Percentage Drug Store.....	San Francisco
1171	Tincture of arnica.....	Mislabeled. Ethyl alco- hol	J. V. Akey.....	Los Angeles
1174	Headache cure	Mislabeled. Acetanilid --	J. V. Akey.....	Los Angeles
1179	Damiana tonic	Mislabeled. Ethyl alco hol	Golden State Wine Co.	Los Angeles
1182	Sausage, goose liver style---	Adulterated. Cereal-----	Heck & Graf.....	Los Angeles

Laboratory Examinations and Analysis—Continued.

Certificate No.	Material.	Violation.	Name of Dealer.	Locality.
1184	Bogle's Quaker Balm	Mislabeled. False claims.	Bogle's Quaker Medicine Co.....	San Rafael
1185	Flour, pastry poinsettia....	Mislabeled. Under weight.....	Excelsior Cereal Milling Co.....	Los Angeles
1186	Syrup of tar and wild cherry	Mislabeled, Alcohol and opium	R. T. Ramage	Los Angeles
1187	Grape tonic, "Mull's".....	Mislabeled. Ethyl alcohol	F. W. Carlisle.....	Los Angeles
1188	McLean's cordial.....	Mislabeled. Ethyl alcohol	H. J. Martin.....	Los Angeles
1189	Shiloh's consumption cure	Mislabeled. Ethyl alcohol, morphine and chloroform	Boericke & Runyon Co.	San Francisco
1195	Eggs	Mislabeled. Not fresh....	S. J. Sill & Co.....	Berkeley

The following food inspection decision has been received since the publication of the last Bulletin:

FOOD INSPECTION DECISION 130.

AMENDMENT TO REGULATION FIVE.

Regulation 5 of the Rules and Regulations for the Enforcement of the Food and Drugs Act of June 30, 1906, is hereby amended to read as follows:

Regulation 5. Hearings.

(Section 4.)

(a) When the examination or analysis shows that samples are adulterated or misbranded within the meaning of this act, notice of that fact shall be given in every case to the party or parties against whom prosecution lies under this act for the shipment or manufacture or sale of the particular product, and such other interested parties as the Secretary of Agriculture may direct, and a date shall be fixed at which such party or parties may be heard before the Secretary of Agriculture or such other person as he may direct. The hearing shall be had at places designated by the Secretary of Agriculture most convenient for all parties concerned. These hearings shall be private and confined to questions of fact. The parties interested therein may appear in person or by attorney and may submit oral or written evidence to show any fault or error in the findings of the analyst or examiner. Interested parties may present proper interrogatories to analysts, to be submitted to and propounded by the Secretary of Agriculture or the officer conducting the hearing. Such privilege, however, shall not include the right of cross-examination. The Secretary of Agriculture may order a reëxamination of the sample or have new samples drawn for further examination.

(b) If, after hearings held, it appears that a violation of the act has been committed, the Secretary of Agriculture shall give notice to the proper United States attorney.

(c) Any health, food, or drug officer or agent of any state, territory, or the District of Columbia who shall obtain satisfactory evidence of any violation of the Food and Drugs Act, June 30, 1906, as provided in Section 5 thereof, shall first submit the same to the Secretary of Agriculture in order that he may give notice and fix dates for hearings to the proper parties.

NOTICES OF JUDGMENTS.

The following Notices of Judgments have been received at the Laboratory since the publication of the last Bulletin. Full notices may be obtained by addressing the Director of the State Food and Drug Laboratory, Berkeley, Cal.:

Notice of Judgment No. 710.—Adulteration and Misbranding of Olive Oil. Cottonseed oil had been mixed with olive oil so as to reduce, lower and injuriously affect its quality.

Notice of Judgment No. 711.—Misbranding of a Food Product—Hochheimer Wine. Labeled "Hochheimer" type, so as to deceive and mislead the purchaser, and purport to be a foreign product when not so, the name "Hochheimer" as applied to wine being a well known trade name applied commonly and generally only to a certain brand of foreign-made wine, when in truth and in fact the product in question was a domestic product, manufactured within state of New York.

Notice of Judgment No. 712.—Adulteration and Misbranding of a Drug Product—Spirits of Turpentine. Product contained large quantity of mineral oil which had been mixed with and substituted for turpentine.

Notice of Judgment No. 713.—Misbranding of Butter. Butter was labeled "Warranted pure, fine, fresh butter," whereas in truth and in fact, said butter was not pure, fine, fresh butter, but was old butter that had been reworked and renovated.

Notice of Judgment No. 714.—Adulteration and Misbranding of Coffee and Chicory Compound. Chicory was mixed and packed with said coffee to reduce, lower and injuriously affect the quality of said coffee.

Notice of Judgment No. 715.—Misbranding of a Product Called "Hair Grower"—"Mrs. Gervaise Graham's Cactico Hair Grower." Label stated that product contained 5 per cent alcohol, whereas in truth and in fact, it contained more than 5 per cent alcohol, to wit: 5.58 per cent alcohol. Label also bore statements "will produce hair on bald heads," "stops falling hair," etc., which said statements are false and misleading in that the product would not produce hair on bald heads, nor stop falling hair.

Notice of Judgment No. 716.—Adulteration of Jam. Product consisted in whole or in part of filthy, decomposed, animal and vegetable substance—spores, yeast mites, etc.

REPORT OF THE STATE HYGIENIC LABORATORY FOR JANUARY, 1911.

WILBUR A. SAWYER, M.D., Director.

During the month of January, 170 specimens were sent to the laboratory by 98 physicians from 55 towns situated in 27 counties. The number of examinations made for each town is shown in the "Report by Towns."* The number of specimens from each county are given in the following list: Alameda 40, Butte 18, Placer 17, Fresno 16, Los Angeles 10, Riverside 7, Kern 5, San Bernardino 5, Santa Clara 5, Shasta 5, Colusa 4, San Mateo 4, Solano 4, Tulare 4, Mendocino 3, San Joaquin 3, Yuba 3, Contra Costa 2, El Dorado 2, Kings 2, Sacramento 2, Stanislaus 2, Tehama 2, Yolo 2, Napa 1, Santa Barbara 1, Santa Cruz 1.

In the following summary are shown the diseases suspected by those requesting laboratory assistance. The results of the laboratory investigations are also shown in the table. The diphtheria cultures represent no large outbreaks. The examinations for rabies showed the presence of the disease in six dogs' heads sent from Riverside, Kern, and Kings counties:

**Editor's Note:* Owing to a large issue of this number for distribution among farmers engaged in squirrel eradication in the plague infected counties, the usual detailed statistics have been omitted.

Summary of Examinations made in the California State Hygienic Laboratory during the month of January, 1911.

Main Laboratory at Berkeley:

Condition suspected:	Positive.	Negative.	Total.
Diphtheria	20	64	84
Malaria	--	2	2
Rabies	6	4	10
Tuberculosis	12	20	32
Typhoid	1	7	8
Water pollution	--	3	3
Miscellaneous	--	--	--
			<u>139</u>

Fresno Branch Laboratory:

Diphtheria	3	15	18
Tuberculosis	--	1	1
Typhoid	4	1	5
			<u>24</u>

Los Angeles Branch Laboratory:

Diphtheria	--	2	2
Tuberculosis	1	1	2
Typhoid	--	3	3
			<u>7</u>

Total number examinations 170

EPIDEMIOLOGY REPORT.

The details of the morbidity reports for the month have been omitted in order to economize space, but will be forwarded to any one writing for them.

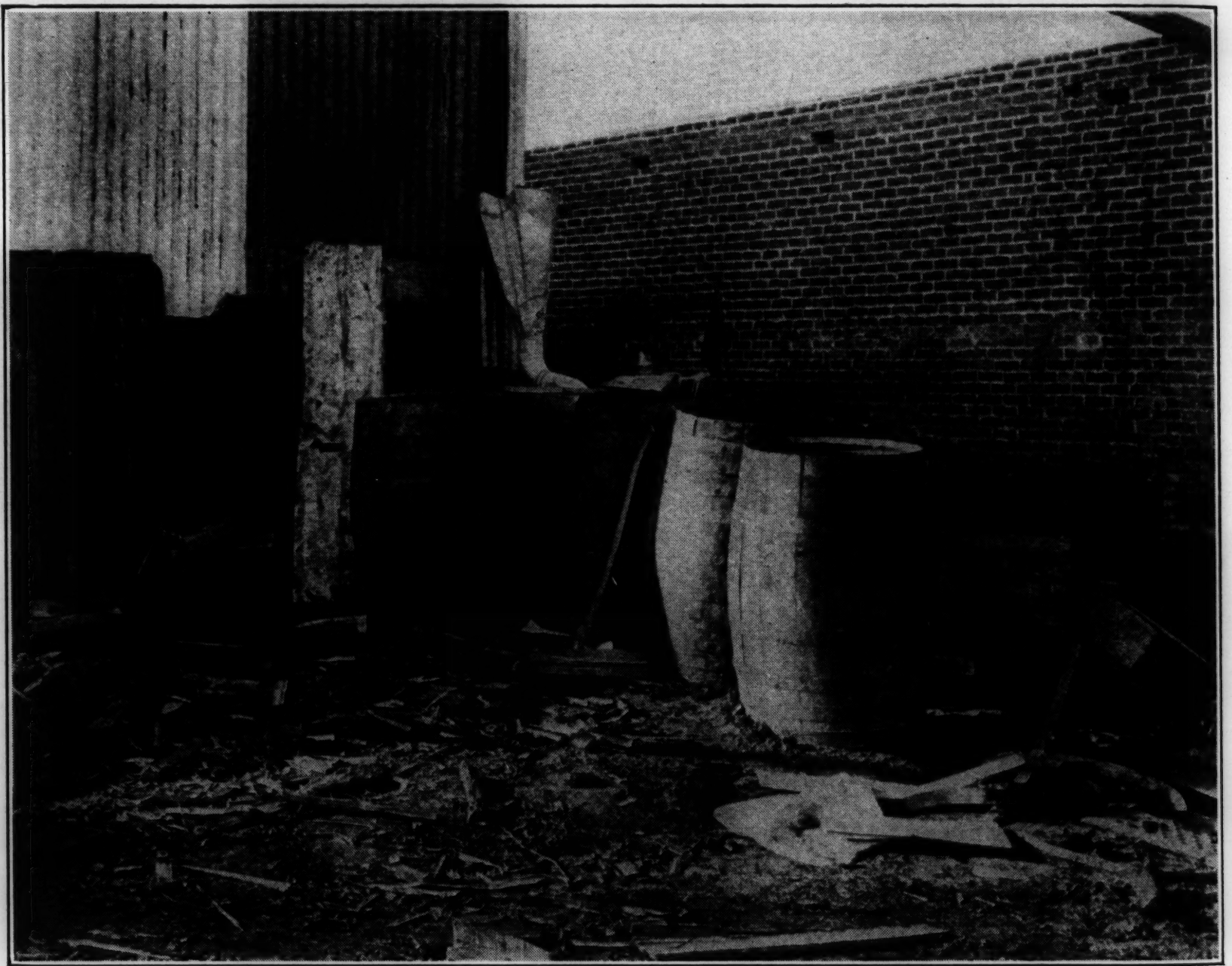
There were 58 cases of typhoid fever reported from 21 places, but no epidemic occurred during the month.

The other important diseases reported occurred as follows: Measles, 166 cases in 21 places; scarlet fever, 193 cases in 31 places; whooping-cough, 60 cases in 9 places; diphtheria, 154 cases in 31 places; malaria, 9 cases in 5 places; smallpox, 22 cases in 8 places.

THE HOME OF THE RAT.

California cities made a remarkable fight against plague in 1908. This fight resolved itself largely into the enforcement of two important measures

1. Clean up your premises.
2. Keep the cover on your garbage can.



The measures were based upon the well known fact that the rat will not remain where food and shelter are very difficult to obtain.

The placard printed on the opposite page is one of many issued by the Citizens' Health Committee during the successful battle which San Francisco waged.

FASTEN THIS UP IN YOUR KITCHEN.

Citizens' Health Committee,
Headquarters, Room 1233 Merchants' Exchange.

TO GET RID OF RATS

KITCHEN RULES.

Keep all supplies in rat-proof bins.

Keep meats in safes or in refrigerators.

Keep uncooked vegetables in crates on shelves. Never on the floor.

IF COOKING IS DONE WITH A COAL FIRE.

Burn in your kitchen fire all refuse (trimmings of meat, bones, parings of vegetables, egg shells, all platter and plate scrapings, and all waste food) as it occurs. This means the putting into the fire of small amounts at a time, when they will readily burn. This is known to be a practical method. By it there is no garbage.

IF COOKING IS DONE WITH A GAS FIRE.

Keep all garbage in covered metal cans.

Keep the cans closely covered.

Have the garbage removed at least twice a week.

Have scavenger carry your garbage can to his wagon.

Report all scavengers who do not do so.

Don't put garbage in slop hoppers.

Always clean up your own premises.

Throw no garbage into the street nor on vacant lots.

Admit authorized Health Inspectors to your premises. They are there for your benefit.

Tell your neighbors to do all the above—and see that they do.

Report to the Committee all cases of insanitary conditions.

These rules to be in force during the existence of plague and afterwards.

EXHIBIT C. THE "KITCHEN CARDS," THOUSANDS OF WHICH WERE GIVEN TO SCHOOL CHILDREN, AT LECTURES IN SCHOOLHOUSES, TO BE TAKEN HOME. FIFTY-TWO THOUSAND IN ALL WERE PUT OUT; TWO THOUSAND IN ITALIAN.

THE CALIFORNIA PUBLIC HEALTH LEAGUE.

OFFICERS.

President,	Second Vice-President,
Mr. A. Bonnheim-----Sacramento	Miss Elizabeth H. Ashe--San Francisco
First Vice-President,	Third Vice-President,
Dr. F. C. E. Mattison-----Pasadena	Dr. George H. Aiken-----Fresno
Secretary-Treasurer, Dr. W. F. Snow, Sacramento.	

"The object of this organization shall be the co-ordination of effort and the promotion of economy and harmony among all public health organizations and agencies in California."

WHEREAS, This Association recognizes the great natural advantages of California for the development of high standards of physical efficiency and healthful environment, and

WHEREAS, California in common with other states permits much needless illness and loss of life because of inadequate organization and funds for health protection; and

WHEREAS, Health conservation rightly demands its place among the progressive conservation policies of the commonwealth; therefore be it

Resolved, That this Association recommends to the careful consideration of the citizens, the legislators, and the Governor of California, all practical measures for health conservation which may be advanced during the 1911 session of the legislature.

Names of officers and information concerning associations, which are members of the League, will be sent on application to the Secretary of the State Board of Health.

LIST OF COUNTY HEALTH OFFICERS.

County.	Health Officer.	Address.
Alameda	Dr. C. L. McKown	Niles
Alpine*	County Recorder Frank Smith	Markleeville
Amador	Dr. E. E. Endicott	Jackson
Butte	Dr. L. Q. Thompson	Gridley
Calaveras	Dr. E. W. Weirich	Angels Camp
Colusa	Dr. C. A. Poage	Colusa
Contra Costa	Dr. F. S. Gregory	Black Diamond
Del Norte*	County Recorder N. G. McVay	Crescent City
El Dorado	Dr. S. H. Rantz	Placerville
Fresno	Dr. W. T. Burks	Fresno
Glenn	Dr. J. A. Randolph	Willows
Humboldt	Dr. E. H. Bryan	Eureka
Imperial	Dr. Virgil McCoombs	Imperial
Inyo	Dr. I. J. Woodin	Independence
Kern	Dr. G. M. Bumgarner	Bakersfield
Kings	Dr. Ralph Motherol	Hanford
Lake	Dr. W. E. Upton	Kelseyville
Lassen	Dr. D. E. Mason	Bieber
Los Angeles	Dr. F. O. Sawyer	Los Angeles
Madera	Dr. Mary R. Butin	Madera
Marin	Dr. J. H. Kuser	San Rafael
Mariposa	Dr. F. L. Wright	Mariposa
Mendocino	Dr. J. Liftchild	Ukiah
Merced	Dr. C. H. Castle	Merced
Modoc	Dr. John Stile	Alturas
Mono*	County Recorder Geo. Delury	Bridgeport
Monterey	Dr. Garth Parker	Salinas
Napa	Dr. Adolph J. Kahn (County Physician)	Napa
Nevada	Dr. Carl P. Jones	Grass Valley
Orange	Dr. C. D. Ball	Santa Ana
Placer	Dr. G. H. Fay	Auburn
Plumas	Dr. F. D. Walsh	Quincy
Riverside	Dr. George E. Tucker	Riverside
Sacramento	Dr. Hugh Beattie	Elk Grove
San Benito	Dr. R. G. Curtis	Hollister
San Bernardino	Dr. D. C. Strong	San Bernardino
San Diego	Dr. Nathan Hunt	San Diego
San Francisco	Dr. W. F. McNutt, Jr.	San Francisco
San Joaquin	Dr. Wm. Friedberger	Stockton
San Luis Obispo	Dr. H. M. Cox	San Luis Obispo
San Mateo	Dr. W. G. Beattie	Colma
Santa Barbara	Dr. J. C. Bainbridge	Santa Barbara
Santa Clara	Dr. William Simpson	San Jose
Santa Cruz	Dr. W. R. Congdon	Santa Cruz
Shasta	Dr. F. Stabel	Redding
Sierra	Dr. R. B. Davey	Downieville
Siskiyou	Dr. F. J. McNulty (County Physician)	Yreka
Solano	Dr. S. G. Bransford	Suisun
Sonoma	Dr. S. S. Bogle	Santa Rosa
Stanislaus	Dr. F. R. De Lappe	Modesto
Sutter	Dr. J. McFadyen	Yuba City
Tehama	Dr. J. S. Cameron	Red Bluff
Trinity	Dr. D. B. Fields	Weaverville
Tulare	Dr. M. E. Pettit	Visalia
Tuolumne	Dr. C. E. Congdon	Jamestown
Ventura	Dr. A. A. Maulhardt	Oxnard
Yolo	Dr. W. J. Blevins	Woodland
Yuba	Dr. J. H. Barr	Marysville

*This county has not been able to arrange with any physician to serve as county health officer.

PARTIAL LIST OF CITY HEALTH OFFICERS.

Alameda	Dr. L. W. Stidham	Merced	Dr. C. H. Castle
Alhambra	Dr. F. E. Corey	Mill Valley	Capt. M. Staples
Alturas	Dr. John Stile	Modesto	Dr. W. J. Wilhite
Anaheim	Dr. J. L. Beebe	Mojave	Mr. A. Smith
Anderson	Dr. J. H. Soothill	Monrovia	Dr. R. D. Adams
Antioch	E. C. Worrill	Monterey	J. E. Freeman
Auburn	Dr. R. F. Rooney	Morgan Hill	Dr. D. W. Watt
Azusa	Dr. S. A. Ellis	Mountain View	Dr. Philo Hull
Berkeley	Dr. J. J. Benton	Napa	J. D. Treadway
Biggs	Dr. B. Caldwell	National City	Dr. Theo. F. Johnson
Black Diamond	Dr. F. S. Gregory	Nevada City	Hugh Murchie
Bakersfield	Dr. G. M. Bumgarner	Oakland	Dr. E. N. Ewer
Chico	G. H. Taylor	Ontario	Dr. C. S. Orr
Chino	Dr. P. M. Savage	Orange	Dr. F. L. Champline
Coalinga	Dr. H. C. Warren	Oroville	Dr. W. F. Gates
Colton	Dr. J. A. Champion	Oxnard	Dr. Ralph W. Avery
Colusa	Dr. W. T. Rathbun	Pacific Grove	Dr. H. N. Yates
Corona	W. H. Chapman	Palo Alto	Hubert O. Jenkins
Coronado	Dr. Raffaele Lorini	Pasadena	Dr. Stanley P. Black
Cottonwood	Dr. A. B. Gilliland	Petaluma	Dr. R. B. Duncan
Davis	Dr. W. E. Bates	Placerville	Mr. P. J. Hall
Doris	Dr. A. A. Atkinson	Pomona	Dr. T. J. Wilson
Dixon	Dr. R. L. Rierson	Piedmont	Geo. T. Burtchael
Dunsmuir	Dr. E. J. Cornish	Randsburg	Mr. E. B. McGinnes
East San Jose	Dr. W. A. Low	Redding	L. D. Poole
Elsinore	Dr. Hugh Walker	Redlands	Dr. J. M. Wheat
Escondido	Dr. David Crise	Redondo Beach	Dr. D. R. Hancock
Etna	Dr. W. H. Haines	Redwood	Dr. J. L. Ross
Eureka	Dr. W. L. Perrott	Richmond	Dr. Chas. R. Blake
Fairfield	Dr. S. G. Bransford	Riverside	Dr. Thos. R. Griffith
Ferndale	Dr. L. Michael	Rocklin	Dr. S. P. Rugg
Fort Bragg	Dr. L. C. Gregory	Sacramento	Dr. Wm. K. Lindsay
Fort Jones	Thos. Bransom	Salinas	S. A. McCollum
Fresno	Dr. Geo. H. Aiken	San Bernardino	Dr. J. G. Ham
Gilroy	Dr. Jonas Clark	San Diego	Dr. F. H. Mead
Glendale	R. E. Chase	San Francisco	Dr. W. F. McNutt, Jr.
Grass Valley	Dr. C. P. Jones	San Jose	Dr. H. C. Brown
Gridley	Dr. L. L. Thompson	San Jacinto	Charles Long
Hayward	Dr. F. W. Browning	San Rafael	Dr. W. F. Jones
Healdsburg	Dr. O. C. Hueb	Santa Ana	Dr. J. I. Clark
Hermosa Beach	H. Vetter	Santa Barbara	Dr. D. A. Conrad
Hollywood	E. O. Palmer	Santa Cruz	Dr. C. H. Anderson
Huntington Park	Dr. W. Thompson	Santa Monica	Dr. W. H. Parker
Kernville	Mr. J. W. Sumner	Santa Rosa	Dr. Jackson Temple, Jr.
Lakeport	Dr. Jabez Banks	Sisson	Dr. L. Gouzuot
Lincoln	Dr. G. W. Davis	South Pasadena	Dr. C. A. Whiting
Lindsay	Dr. Walter W. Tourtillott	Stockton	Dr. S. W. R. Langdon
Livermore	Dr. H. G. McGill	Taft	Mr. J. W. Bursell
Lodi	Dr. F. W. Colman	Tracy	Dr. J. G. Murrell
Long Beach	Dr. W. H. Newman	Turlock	Dr. E. L. Clough
Los Angeles	Dr. L. M. Powers	Vacaville	Mr. A. P. Finan
Los Gatos	Dr. Elenor S. Yelland	Vallejo	Dr. F. T. Bond
Madera	Dr. Mary R. Butin	Watsonville	Dr. F. H. Koepke
Maricopa	Mr. Thad Cheeney	Woodland	W. D. Clary
Martinez	Dr. E. E. Brown	Whittier	Dr. W. H. Stokes
McCloud	Dr. R. T. Legge	Yreka	Dr. A. J. Collar
McKittrick	Mr. G. M. Chitwood		

**THE CALIFORNIA STATE BOARD OF
HEALTH BULLETIN WILL BE SENT
FREE TO ANY CITIZEN OF THE STATE
ON REQUEST.**